

## **DMS-8110, Coatings for Concrete**

### **Overview**

Effective Date: March 2003 – July 2004 (refer to 'Archived Versions' for previous versions).

This Specification governs the materials, composition, quality, sampling, and testing of coatings for concrete, and contains Standard Formulae for Class B, Type II Coating and finished product requirements for Class A Coatings, Clear Acrylic Sealers, and Opaque Concrete Sealers.

### **Bidders' and Vendors' Requirements**

Before any bid is considered, the Department or the Texas Building and Procurement Commission (TBPC) may require the bidder or vendor to submit a detailed statement of previous experience in performing similar or comparable work, business and technical organization, financial resources, and manufacturing facilities, which are to be used in performing the work described in the Contract.

The Department or TBPC may reject any bid submitted for unsatisfactory facilities, resources, or experience.

### **Payment**

#### ***Procurement by the State***

Payment for all materials will be in conformance with the conditions prescribed in the Contract awarded by the Department or TBPC.

#### ***Contracts***

All materials utilized in the performance of the specified work are subsidiary to the bid item or are paid for in conformance with the bid item in the Contract.

#### ***Charge for Failing Samples***

The cost of sampling and testing failing material is \$250 per sample. CST/M&P must receive a cashier's check made payable to the "TxDOT Fund" before further qualification samples will be evaluated or scheduling inspection or sampling of a replacement for a failed batch of paint.

### **Establishment of Quality**

Submit product samples to ascertain the capability of producing a material conforming to the requirements of this Specification to the Materials and Pavements Section of the Construction Division (CST/M&P).

At no cost to the supplier, the Department will evaluate one sample, per type of coatings for concrete to establish specification compliance. If the first sample fails to meet the requirements, a 'Charge for Failing Samples' will apply for each sample submission needed for qualification. Once a supplier has established quality, one submission of reformulation, per type, is permitted each year at no cost to the supplier.

Except for transition periods not to exceed 3 mo., a supplier may not supply coatings of more than one approved formula per type of coating at the same time.

### **Disqualification**

The Department reserves the right to perform any tests to ascertain if a reformulation was made without securing approval for the reformulation. Any change in formulation detected without requalifying will be cause to withdraw qualification. Requalification is not allowed in less than 6 mo. A supplier who has had a product qualification withdrawn due to formulation change will pay the 'Charge for Failing Samples' with each new submission for requalification.

### **Sampling, Testing, and Inspection**

The Department will sample raw materials and finished coating in accordance with the following:

"Tex-801-B, Testing Coatings and Related Material," during production of the coating or

"Tex-813-B, Preparing Class B Textured Coatings for Concrete for Sampling or Use," if sampled on a job site.

The Department will test raw materials and finished coatings in accordance with *CST/M&P Manual of Testing Procedures*.

CST/M&P will perform any or all tests required to establish or verify performance. In case of variance, the Department's tests will govern. Address any questions to the Texas Department of Transportation, Construction Division, Director of Materials & Pavements Section (CP51), 125 E. 11th Street, Austin, TX 78701-2483.

#### ***Materials to be Tested***

All products required to meet Standard Formulae and bought by the Department or by Contractors, for use on projects under the Department's jurisdiction, are required to be inspected and tested

### ***Agency***

The Department or a commercial laboratory designated by the Department will perform all testing of finished products and raw materials, as well as inspection during manufacture.

### ***Tests***

The following test methods are used in this Specification.

<b>Test Methods</b>	
<b>Type</b>	<b>Test Method</b>
Accelerated Weathering	"Tex-814-B, Weathering Characteristics of Clear Acrylic Sealer for Exposed Aggregate"
Condition in Container	Federal Test Method 141c, Method 3011.2, "Condition in Container"
Consistency (Viscosity)	ASTM "D 562, Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer"
Density (Gallon Weight)	ASTM "D 1475, Standard Test Method for Density of Liquid Coatings, Inks, and Related Products"
Grind	ASTM "D 1210, Standard Test Method for Fineness of Dispersion of Pigment-Vehicle Systems by Hegman-Type Gage"
Infrared Spectrum	"Tex-888-B, Obtaining the Infrared Spectrum of Organic Materials"
Percent Solids (Nonvolatile Content)	ASTM "D 2369, Standard Test Method for Volatile Content of Coatings"
pH	ASTM "E 70, Standard Test Method for pH of Aqueous Solutions With the Glass Electrode"
Sag	"Tex-812-B, Evaluating Sag Resistance of Coatings"

### ***Basis for Rejection***

Raw materials and finished products, which fail to meet any material requirement, may be subject to rejection. Final acceptance will be based on the following:

1. the results of tests on raw material samples and finished products taken during production, or
2. tests performed on finished products as soon as practical after their arrival at the shipping destination.

Approval of materials due to preliminary testing before manufacture will not be binding upon final approval. Because of the possibility of contamination and volatile losses, the Wet Standard prepared by the Department will constitute the standard for final comparison involving acceptance or rejection. Samples of these standards are available to the manufacturer. The judgment of the Director of CST/M&P will be final in all questions relative to conformance with the Specification provisions.

**Costs**

The Department will normally bear the costs of sampling and testing; however, the bidder or vendor will bear the costs of sampling and testing of materials that fail to conform to the requirements of this Specification. CST/M&P must receive the 'Charge for Failing Samples' before scheduling a replacement batch for inspection and manufacture or sampling of a noninspected material. The manufacturer may be required to reimburse the Department for the cost of storage and handling of paints failing to meet requirements.

For coatings purchased by a Contractor from a manufacturer who does not have a current, valid warehouse agreement for pretested stock with the Department, all costs of inspection and testing will be charged to the Contractor and deducted from the amounts due him on monthly and final estimates.

**Sequence of Inspection**

Provide the brand names and characteristics of all raw materials that will be used to the Director of CST/M&P, and arrange for inspection of production.

The Department's inspector will take samples of raw materials actually used in production and samples of the finished product.

Provide standard friction-seal 0.47 L (pint) cans for the sampling of raw materials and the finished product. To prevent rusting, lined sample cans are required for waterborne materials and finished coatings.

Manufacture will be witnessed in whole or part at the discretion of the testing agency. Obtain prior specific approval to begin production before the arrival of the Department's inspector. The manufacturer must allow the inspector free access to those areas of the manufacturing facility where the products are manufactured or raw materials are stored, and in all other ways facilitate the inspector in performing his duties.

Store raw materials and finished products in an orderly fashion at all times to permit proper and correct inventory.

**Conformance of Finished Products**

Manufacture the finished products on a weight basis to the composition requirements of the Standard Formulae.

NOTE: No variation from the Standard Formulae is permitted, except for the replacement of volatiles lost in processing unless approved by the Director of CST/M&P.

The finished products must meet requirements for the Standard Formulae, such as color, drying, flow, settling, brushability, can stability, hiding, etc. and film characteristics, such as: gloss, hardness, light permanence, and adhesion.

Test materials for conformance under parallel conditions with the Wet Standard made by CST/M&P using the raw materials listed in the 'Standard Formulae.'

### **Manufacturing Procedures**

The Department will leave manufacturing procedures, except when specified, to the discretion of the manufacturer.

It is the responsibility of the manufacturer to assure that the proposed raw materials and manufacturing procedures will produce a product meeting these requirements.

### **Finished Products**

No skins or foreign materials are allowed in the finished product.

Fill containers by weight based on the actual density (gallon weight) of the product at 25°C (77°F).

NOTE: Viscosity, drying, and density (gallon weight) determinations on coatings are made at 25°C (77°F). Measure viscosity with a Krebs modified Stormer Viscometer and test using ASTM D 562. Test the density using ASTM D 1475.

### **Containers and Markings**

Ship in suitable, strong, well-sealed containers that meet specification and federal requirements, and are sufficiently sturdy to withstand normal shipping and handling.

Plainly label the finished product containers and cases with the following:

"TxDOT,"

name and designation (class and type) of the product,

requisition number (if applicable),

batch number,

expiration date,

volume,

manufacturer's name and address, and

"For Industrial Use Only" or "For Professional Use Only."

Attach label securely.

Use labels that are moisture resistant to withstand outdoor storage for a minimum of 1 yr. Attach the label to the sides of the containers and cases. When the finished product is palletized, place the containers with the labels facing to the outside for easy identification. Once affixed, do not modify or change the label in any manner without specific approval of the Director of CST/M&P.

Supply a Material Safety Data Sheet to comply with OSHA's Hazard Communication Standard 29 CFR § 1910.1200.

## **Raw Materials**

### ***Substitutions***

The exact brands and types of raw materials used in the Wet Standard are listed for facilitating the selection of parallel materials equal not only in quality and composition, but also in physical and chemical behavior after aging in the finished product.

Since evaluation of the finished product containing questionable materials may require 60 days and since meeting the delivery schedule is the responsibility of the manufacturer, the manufacturer should schedule material procurement and production to permit delivery commitments.

The Director of CST/M&P will make the final decision as to the equality of materials.

After the Department has agreed to the brand names and types of raw materials proposed by the manufacturer, no substitution is allowed during the manufacture without prior agreement with the Department.

NOTE: It is the manufacturer's responsibility to select raw materials, which not only meet the individual raw material specifications, but also produce a finished product meeting the specific formula requirements.

### ***Materials of Foreign Origin***

Because of the limited information available on materials manufactured outside the continental limits of the United States, the manufacturer is advised to review 'Substitutions' in 'Raw Materials' when considering the use of materials of foreign origin.

### ***Specifications***

Any Department, federal, and ASTM specifications in effect on the date of the proposal or invitation to bid, govern the requirements of all materials.

### ***Pigments***

Titanium Dioxide, Rutile - ASTM "D 476, Standard Classification for Dry Pigmentary Titanium Dioxide Products," Type II

Talc - ASTM "D 605, Standard Specification for Magnesium Silicate Pigment (Talc)"

### ***Resins***

In addition to the requirements below, the infrared spectrum of all resins shall match the spectra on file with CST/M&P.

Acrylic Resin Emulsion - Reichhold Chemicals, Inc., Synthemul 40-412 or equivalent meeting the following requirements:

<b>Acrylic Resin Emulsion Requirements:</b>	
<b>Test</b>	<b>Requirement</b>
Appearance	Milky, White Liquid
Dry Film	Clear, Transparent
pH	8.5 - 9.5
Solids	±1.0% of published value

### ***Solvents***

Coalescents

2,2,4-Trimethyl-1,3-Pentanediol Monoisobutyrate

UCAR filmer IBT

Texanol.

Propylene Glycol - ASTM "D 2695, Specification for Propylene Glycol"

### ***Miscellaneous Materials***

Materials listed below must be similar and equal to the standard sample submitted by the vendor to and approved by the Department before award of contracts for coatings in which the material is proposed for use.

Hydroxy Ethyl Cellulose (biological stabilized versions are acceptable)

Cellosize QP-4400

Natrosol 250 MHR

Methocel K15 MS

Bermocoll EBS-431.

Defoamers

Balab #748

Byk 035

Colloids 640

Drew Y-280

Foamaster 111.

Dispersants

Tamol 850

Byk 156

Colloids 226/35

Nopcosperse 44.

Surfactants

Triton CF-10

Igepal CTA-639W.

Mildewcides

Nopcocide N-96

Polyphase AF-1

Metasol TK-100

Nuocide 960

Nuocide 404-D

Skane M8.

Preservatives

Nuosept 95

Troysan 192

Troysan 174

Tektamer 38AD

Nuosept 101

Dowacil 75.

### **Finished Product Requirements and Formulae**

This Specification describes the general and specific requirements for 2 classes of coatings for concrete, a clear acrylic sealer for exposed aggregate finishes and an opaque concrete sealer (architectural stain).

Unless otherwise shown on the purchase order or on the plans, Class A and B coatings color is concrete gray to match Federal Standard 595B color number 35630. When the purchase order or the plans show other colors, match the color of the concrete coating to the color standard supplied by the Engineer.

#### ***Class A Coatings for Concrete***



Class A coatings for concrete is an adhesive grout textured coating. Mix one part white cement, one part natural (gray) cement, 2 parts masonry sand, one part acrylic emulsion (refer to 'Resins, Acrylic Resin Emulsion' in 'Raw Materials'), and enough water to form a viscous slurry that the material may be applied by spray gun, brush, or roller without appreciable running or sagging.

To obtain the desired color, vary the proportions of the white and the natural cement. The Engineer will specify the gradation of the masonry sand for the desired texture.

Prepackaged materials, meeting these requirements and acceptable to the Engineer as to color, texture, and appearance will be permitted.

### ***Class B Coatings for Concrete***

Class B coatings for concrete is described by a standard formula.

Class B, Type II – When applied on vertical surfaces at a maximum 3.7 m<sup>2</sup> per liter (150 sq. ft. per gallon), no runs, sags, or nonuniformity of appearance are allowed in the Class B, Type II coating.

<b>Class B, Type II, Coatings for Concrete</b>		
	<b>Kilograms</b>	<b>(Pounds)</b>
Titanium Dioxide, Rutile	68.0	(150)
Talc	102.1	(225)
50% Acrylic Emulsion, Reichhold 40-412*	190.5	(420)
Dispersant, Tamol 850	4.5	(10)
Surfactant, Triton CF-10	1.4	(3)
Hydroxy Ethyl Cellulose, 250MHBR	1.8 - 2.7	(4 - 6)
Coalescent, Texanol	5.4	(12)
Preservative, Dowacil 75	.9	(2)
Mildewcide, Nuocide 404-D	1.4	(3)
Defoamer, Foamaster 111	1.8	(4)
Propylene Glycol	11.3	(25)
Water, Potable*	120.2	(265)
Total	509.3 – 510.2	(1123 - 1125)

\*Emulsions with variable percent solids are permitted. Adjust amounts of water and emulsion.

<b>Specification Requirements</b>	
<b>Test</b>	<b>Requirement</b>
Density (Gallon Weight)	± 0.012 kilograms per liter of theoretical density. (± 0.10 of theoretical gallon weight).
Grind	4 minimum
Viscosity	85-95 KU
Sag	200 micrometers (8mils) minimum
Color	Requires tinting to match standard

### ***Opaque Concrete Sealers***

Opaque concrete sealers are solvent-borne stain-type coatings capable of waterproofing as well as coloring finished concrete. These coatings consist of a blend of acrylic and silicone resins and toning pigments suspended in solution at all times by a chemical suspension agent and solvent. Use laminar silicates, titanium dioxide, inorganic oxides, and other mineral pigments for toning. Use of organic pigments, vegetable or marine oils, paraffinic materials, or stearates in the formulation are not permitted.

This coating must be capable of being coated with itself or other solvent-borne coatings without special surface preparation being necessary.

The Contractor must supply to the Engineer a notarized certification attesting to the compliance of the opaque concrete sealer with the requirements of this Specification.

### ***Clear Acrylic Sealers***

Coatings for exposed aggregate finishes are a clear, nonyellowing acrylic resin solution at a minimum of 20.0% solids by weight. The solvent system will comply with the Environmental Protection Agency's Volatile Organic Compounds rule for sealers.

<b>Rule for Sealers</b>		
	<b>Test Method</b>	<b>Requirements</b>
- Condition in Container	Federal Test Method Standard No. 141c, Method 3011.2	Must pass all requirements and Coating must readily disperse by paddle to a uniform consistency
Nonvolatile Content	ASTM D 2369	20.0% minimum solids by weight and Nonvolatile content must not vary by more than $\pm 1.0$ percentage point of the original prequalification sample
Viscosity	ASTM D 562	Will not vary by more than $\pm 5$ KU of the original prequalification sample
Accelerated Weathering	Tex-814-B	No yellowing, checking, cracking, adhesion loss, or other film defects and No tackiness before or after testing
Infrared Spectrum	"Tex-888-B, Obtaining the Infrared Spectrum of Organic Materials"	Must match spectrum on file with CST/M&P

### **Archived Versions**

Archived versions of "DMS-8110, Coatings for Concrete" are available through the following links:

Click on [8110-0898](#) for the specification effective August 1998 through February 2003.

